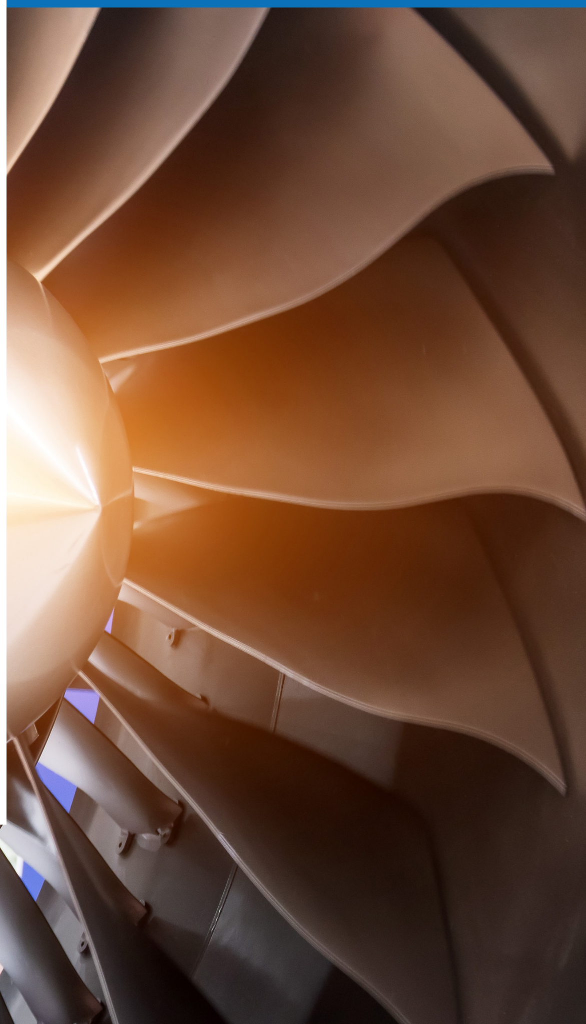
CONSULTATION RESPONSE

November 2024

Draft Technical Specifications for the Certification of Permanent Carbon Removals Through DACCS



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Bellona welcomes the opportunity to provide substantive input to the methodology on DACCS and BioCCS. Given the voluntary nature of the Carbon Removal and Carbon Farming Certification Framework (CRCF) and its intended purpose to generate net carbon removal units, ostensibly to be used in the voluntary carbon market, Bellona sees this and other biomass-based methodologies as an opportunity to go beyond the requirements of the Renewable Energy Directive, to enhance the accuracy and stringency for biomass conversion, with transparent and broader system boundaries as well as stricter overall sustainability requirements for biomass sourcing, which will safeguard the intended climate benefits.

While the methodology seems consistent for CCS components for DACCS and BioCCS project certification, Bellona reiterates its recommendation to add criteria of additionality, geographical and temporal correlation of renewable electricity consumption to the methodology and thereby ensure full implementation of the rules for RFNBOs. Bellona also sees this methodology as an opportunity to go beyond the RED III criteria for determining biomass feedstock sustainability. Stringency for biomass conversion with transparent system boundaries is important to safeguard overall sustainability and climate benefits of BioCCS projects.

Furthermore, this methodology is a missed opportunity to implement a modular approach for the set of methodologies across the certification framework, which was initially understood to be a key feature of the CRCF methodologies. This methodology could clearly define its constituent modules for capture via biomass-based removals or Direct Air Capture with a common CCS-based storage module that could be reused across different technological pathways.

General comments

The logic of grouping BioCCS and DACCS under permanent removals for the methodology is justified as they share a similar technology, that is the CCS component. However, BioCCS has a carbon source which is very different in terms of carbon accounting and atmospheric effects, compared to the process involved for Direct Air Capture. While there is a clear systems boundary definition and calculations provided for the DAC and the CCS (carbon capture, transport and storage) components, this is lacking on the biomass sourcing aspect relevant to BioCCS. This disregards the complexity of assessing the overall climate effect of biogenic carbon sinks and the harvesting of biomass, among others. By referring to other regulations for biomass, it does not provide sufficient transparency across the whole lifecycle of a BioCCS project (LCA on the whole activity from cradle to grave) and does not address the issue of baseline setting for BioCCS. A dedicated module for biomass sourcing would be useful for quantification and could be used across different CRCF methodologies (BioCCS, biochar, carbon farming, and carbon storage in products).

For DACCS, the emissions associated to the sourcing of energy are included in a sufficiently robust way such that zero-rating is only allowed if there are assurances that the use of renewable energy does not eat into the decarbonisation of the grids and of other sectors reliant on its decarbonisation. Done in consistency with the rules for producing Renewable Fuels of Non-Biological Origin (RFNBOs), Bellona strongly supports this measure. This is also mentioned in the Zero Emissions Platform's recent report. This logic is necessary; however, it is missing from the methodology presented for BioCCS, and other biomass-based approaches, and could be similarly introduced to ensure biomass feedstocks are not unsustainably sourced and exploited, therefore going beyond the RED's sustainability criteria. These criteria should ensure that the timing of the carbon absorption and the location of the biomass are better matched with the generation of net carbon removal unit, and that the biomass sourcing does not add additional pressure on biomass supplies.

Effectively, to allow biomass to count as zero-rated as in input to any biomass-based CRCF project, it should follow a similar regime as the DACCS and RFNBO rules for zero-rating the energy input of those projects. Alternatively, full upstream emissions from the sourcing of biomass should be subtracted from biomass-based net carbon removal units.

It is worth highlighting that the DACCS methodology is clearly developing well and is sufficiently stringent to generate carbon removal units which can be understood as being high-quality, as per the intent of the regulation. However, this level of rigour and stringency is not applied to BioCCS or biochar, creating an uneven playing field where other CDR methods might be able to generate carbon removal units of significantly lower quality and possibly with question marks as to their overall carbon removal benefit. Bellona highlights that all methodologies under the 'permanent carbon removals' category should be as stringent and robust as the DACCS methodology such that there can be a comparable level of trust that a net carbon removal benefit has in fact been generated.

Specific input

- Section 1.1. Carbon Removal Sinks and GHG Emission Sources

The materiality threshold, defined as "Any emission from a source within the system boundaries shall be considered material where it is associated with emissions equal to or greater than 2% of the gross carbon removals…" (p. 10), should be clarified to ensure that this limit applies to the sum of all sources of emissions deemed 'immaterial'. Otherwise, there is a risk that multiple sources of emissions that are all below 2% individually are permitted and would create significant emissions that are under counted.

- Section 3: Activity Period, Monitoring Period And Certification Period

The activity period should be expanded for BioCCS to ensure that the carbon removal that from the atmosphere that occurs from biomass production in incorporated into the activity period. Only then is there comprehensive accounting of the emissions and removals for this part of the process.

- Section 4: Requirements For Quantification

Generally, the methodology works smoothly for calculations at the point of capturing the CO_2 for DACCS and its CCS value chain. However, for BioCCS, there is a lack of quantification of the carbon emissions of the sink itself. Emissions from the sourcing, supplying and processing of biomass itself should be clearly accounted and presented in the methodology. The zero rating of biomass at the point of conversion is problematic since the methodology should encompass all life cycle emissions of the value chain of the biomass conversion. There is a risk that this value chain might not realise negative emissions in reality, an issue that has been raised by the European Academies' Science Advisory Council for numerous years (2019). The provided justification that currently "emissions of biogenic CO_2 from combustion or processing of sustainable biomass is not subject to the EU's ETS" (p. 13, 2. Baseline) is not relevant since this framework is not related to the ETS.

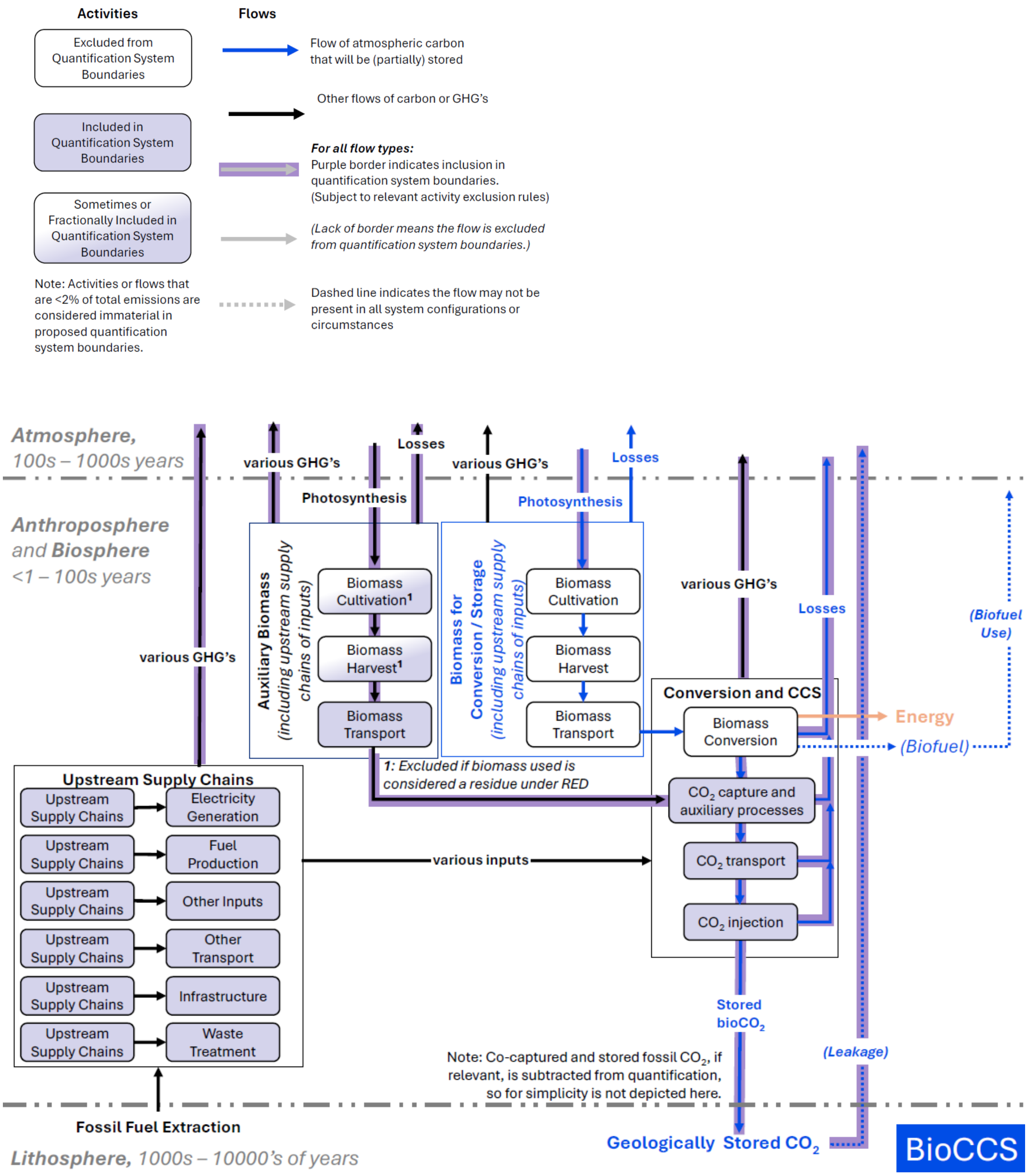
For DACCS, expectations for accurate emissions reporting from energy input and capture efficiency should be clearly laid out in the methodology.

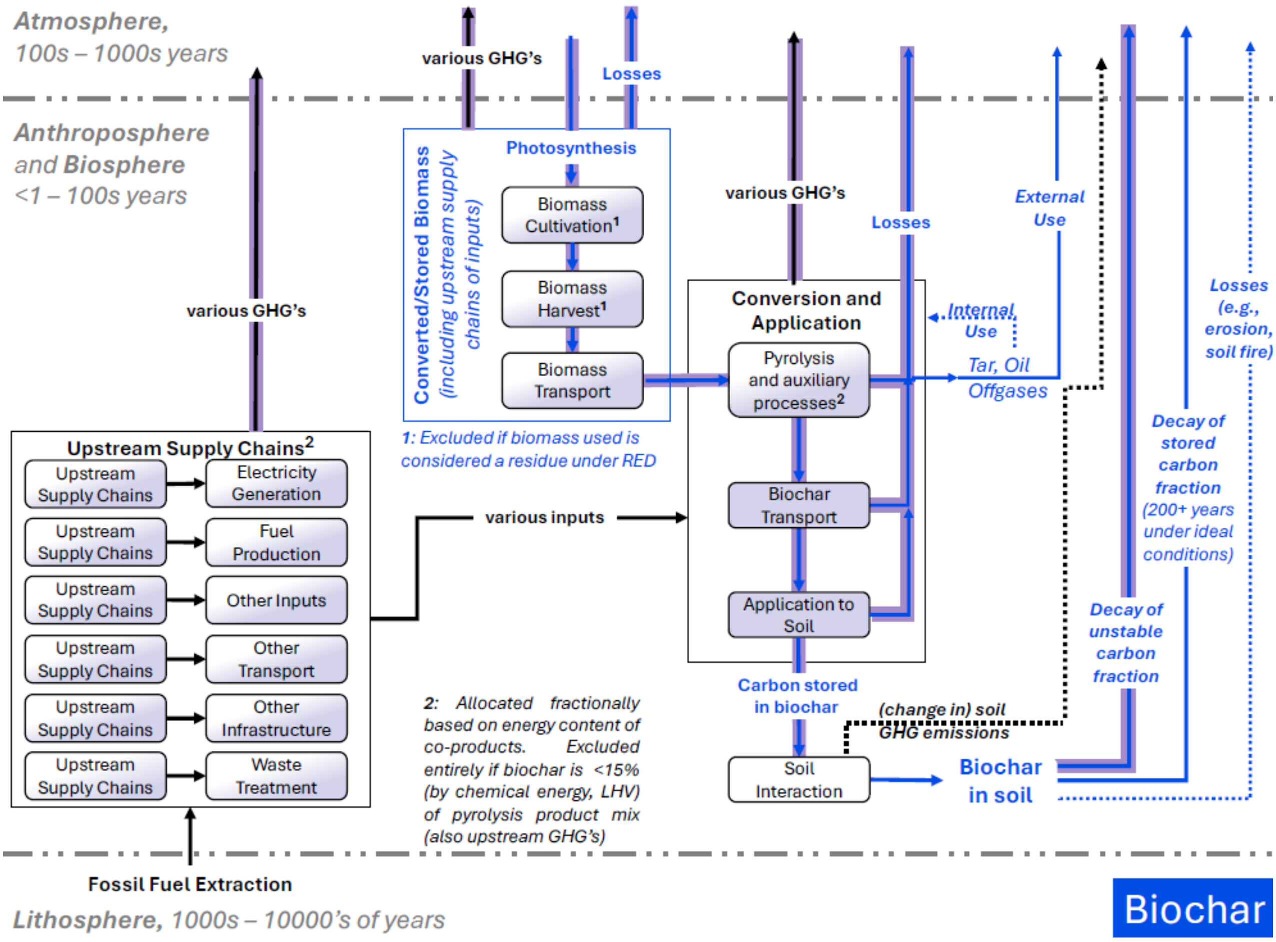
As stated in the methodology, the 'system boundary' is defined as the:

> *conceptual boundary drawn around the set of subactivities that are performed due to the implementation of a permanent carbon removal activity and that must be considered in the calculation of the permanent net carbon removal benefit of the activity, and may include geographically non-contiguous facilities.*

However, this robust and comprehensive definition is lacking the actual definition of the system's boundary (see Figure 1).

Key


Activities
Flows
Excluded from Quantification System Boundaries
Flow of atmospheric carbon that will be (partially) stored
Other flows of carbon or GHG's
Included in Quantification System Boundaries
For all flow types:
Purple border indicates inclusion in quantification system boundaries.
(Subject to relevant activity exclusion rules)
Sometimes or Fractionally Included in Quantification System Boundaries
(Lack of border means the flow is excluded from quantification system boundaries.)
Note: Activities or flows that are <2% of total emissions are considered immaterial in proposed quantification system boundaries.
Dashed line indicates the flow may not be present in all system configurations or circumstances
Atmosphere, 100s – 1000s years
Anthroposphere and Biosphere <1 – 100s years
Lithosphere, 1000s – 10000's of years
various GHG's
Losses
Photosynthesis
Auxiliary Biomass (including upstream supply chains of inputs)
Biomass Cultivation[1]
Biomass Harvest[1]
Biomass Transport
Biomass for Conversion / Storage (including upstream supply chains of inputs)
Biomass Cultivation
Biomass Harvest
Biomass Transport
1: Excluded if biomass used is considered a residue under RED
Conversion and CCS
Biomass Conversion
Energy
(Biofuel)
(Biofuel Use)
CO_2 capture and auxiliary processes
CO_2 transport
CO_2 injection
various inputs
Upstream Supply Chains
Upstream Supply Chains
Electricity Generation
Fuel Production
Other Inputs
Other Transport
Infrastructure
Waste Treatment
Fossil Fuel Extraction
Stored bioCO_2
(Leakage)
Note: Co-captured and stored fossil CO_2, if relevant, is subtracted from quantification, so for simplicity is not depicted here.
Geologically Stored CO_2
BioCCS


Atmosphere,
100s – 1000s years
Anthroposphere
and Biosphere
<1 – 100s years
various GHG's
various GHG's
Losses
Photosynthesis
Biomass Cultivation[1]
Biomass Harvest[1]
Biomass Transport
Converted/Stored Biomass (including upstream supply chains of inputs)
1: Excluded if biomass used is considered a residue under RED
various GHG's
Losses
External Use
Internal Use
Tar, Oil Offgases
Conversion and Application
Pyrolysis and auxiliary processes[2]
Biochar Transport
Application to Soil
Carbon stored in biochar
(change in) soil GHG emissions
Soil Interaction
Biochar in soil
Losses (e.g., erosion, soil fire)
Decay of stored carbon fraction (200+ years under ideal conditions)
Decay of unstable carbon fraction
Upstream Supply Chains[2]
Upstream Supply Chains
Electricity Generation
Upstream Supply Chains
Fuel Production
Upstream Supply Chains
Other Inputs
Upstream Supply Chains
Other Transport
Upstream Supply Chains
Other Infrastructure
Upstream Supply Chains
Waste Treatment
various inputs
2: Allocated fractionally based on energy content of co-products. Excluded entirely if biochar is <15% (by chemical energy, LHV) of pyrolysis product mix (also upstream GHG's)
Fossil Fuel Extraction
Lithosphere, 1000s – 10000's of years
Biochar

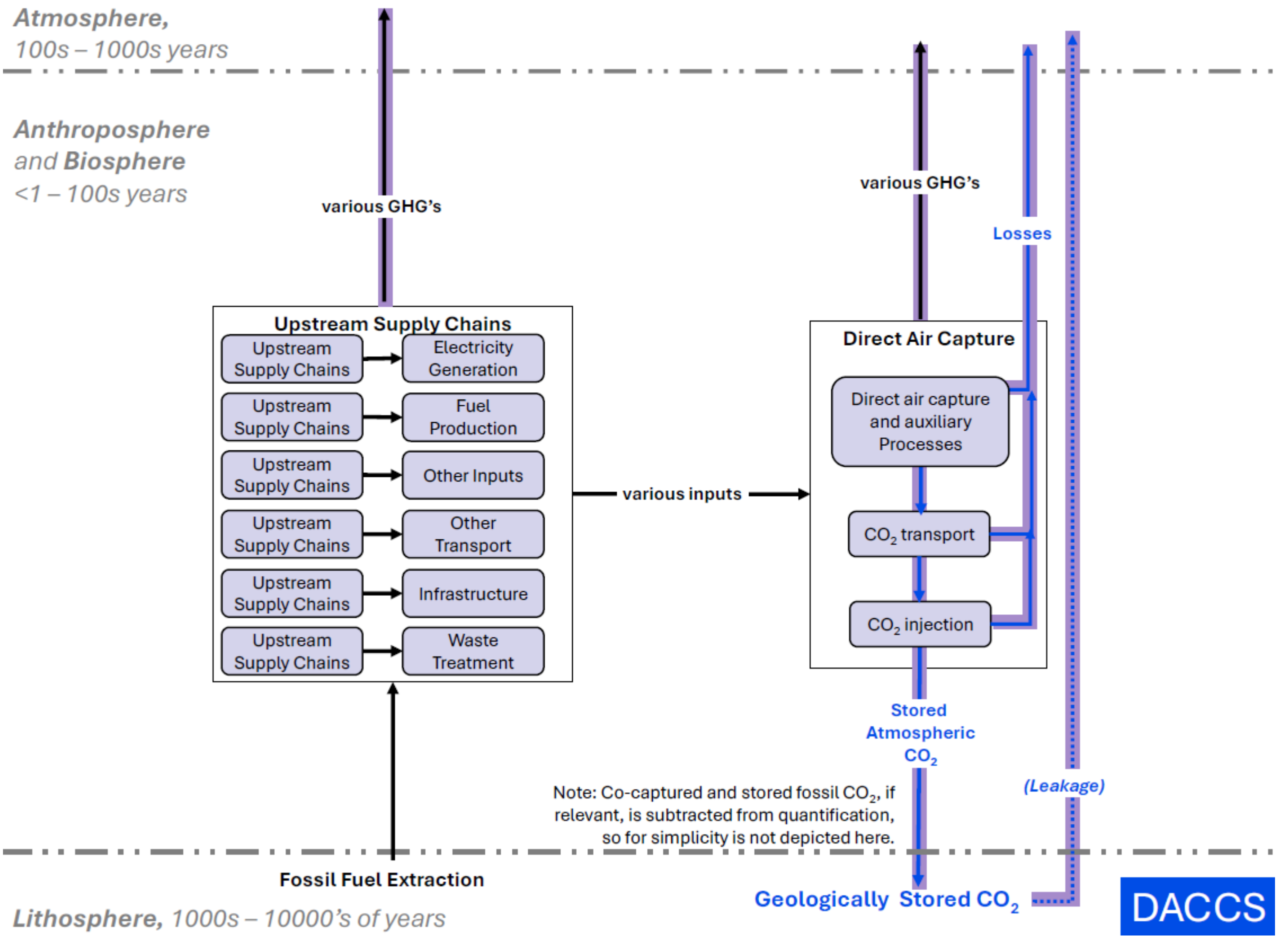

Atmosphere,
100s – 1000s years
Anthroposphere
and Biosphere
<1 – 100s years
various GHG's
various GHG's
Losses
Upstream Supply Chains
Upstream Supply Chains
Electricity Generation
Upstream Supply Chains
Fuel Production
Upstream Supply Chains
Other Inputs
Upstream Supply Chains
Other Transport
Upstream Supply Chains
Infrastructure
Upstream Supply Chains
Waste Treatment
various inputs
Direct Air Capture
Direct air capture and auxiliary Processes
CO_2 transport
CO_2 injection
Stored Atmospheric CO_2
(Leakage)
Note: Co-captured and stored fossil CO_2, if relevant, is subtracted from quantification, so for simplicity is not depicted here.
Fossil Fuel Extraction
Lithosphere, 1000s – 10000's of years
Geologically Stored CO_2
DACCS

Figure 1: System boundaries for BioCCS, biochar, and DACCS indicating which emissions are included, or not, within the current methodology and a key to understand the diagram. Figure provided by Dr. ir. Samantha Tanzer, University of Technology Delft.

Typically, in the context of Life Cycle Assessments, the system boundaries are defined. For BioCCS, it would calculate emissions starting from the very growth of the biomass (including forest management, whether the biomass is regrown or not, etc.) until eventual storage of the removed carbon. These emissions would include those arising from the LULUCF sector. For BioCCS, lifecycle analysis (LCA) should quantify all emissions involved in sourcing, processing, and storing the biomass, that is from cradle-to-grave. We note that the definition of cradle-to-grave is not mentioned in the methodology. Emissions from biomass supply is considered for the energy required to operate the capture facility, but the emissions from the actual supply of the biomass for the capture of CO_2 itself are not included. A cradle to grave approach is essential, yet the emissions from the sourcing, processing, transport and supply of the feedstocks are neither defined nor included. For BioCCS, it is crucial to realise that the term represents a myriad of processes, and it seems that the biomass conversion step is not explicitly considered in the methodology. For BioCCS, MRV systems should consider the biomass growth rate, carbon content, and end-of-life for the biomass.

For DACCS, energy inputs should be assessed and their sources to ensure the process uses low-carbon energy. Lifecycle assessments for BioCCS and DACCS projects should evaluate, biodiversity impacts, water usage, and other environmental factors. These do not appear under the list of Sustainability Requirements (Section 6, p. 46).

From the methodology, it is what happens in the event of the permanent of carbon net removal is not realized? The methodology fails to provide a framework to assess if the quality criteria is realised, i.e. "removals need to outweigh any emissions associated with the implementation of the activity". In terms of defining compliance and enforcement standards: penalties for non-compliance with carbon capture and storage standards should be set, including metrics for minimum carbon removal thresholds (i.e. "CDR efficiency"). As projects are not under the scope of the EU ETS, alternative penalties than surrendering ETS allowances may be required.

3. Installations capturing atmospheric CO_2 from ambient air

3.2.3 Emissions from inputs (GHGinputs)

Equations 11 and 20 refer to < of 2% of CR_{total}, whereas the text introducing those equations refers to 1%*$CR_{total.}$ This is confusing and should be aligned.

4 Installations Capturing CO_2 from Point Sources of Biogenic Emissions

4.2 Quantification of Associated Greenhouse Gas Emissions

$$GHG_{bio} = \sum Q_{biomass} * EF_{biomass}$$

Where $EF_{biomass}$ is the life cycle emissions value of the biomass as defined in *Section 4(7.2)*.

Details in this section of the methodology for calculating the life cycle emissions of the biomass were not found. *Section 7.2.3* only refers to the emissions factor associated with any consumption of biomass shall be calculated following the GHG emissions associated with biomass supply Annex V and VI of RED III.

6. Storage of CO_2

$CO_{2\ activity,S}$ = amount of CO_2 from the activity stored at site S in the certification period. This amount must be specified on a *mass balance basis*. There is no further description / methodology of the mass balance calculation.

7.2. Emission Factors

The criteria for what must be considered included system boundary is not clearly defined. It would be helpful to reiterate this here and this should comprehensively include all relevant activities.

The emission factors for transport of biomass are the only ones given here, leaving no guidelines methodology for the other type of emissions (processing, sourcing, supply, etc.).

7.2.3. Biomass

There is no section on the Bioenergy part of the "activity" and understanding how this respects the cascade principle presented in the RED and referred to in the CRCF text. Biomass for bioenergy (especially bioelectricity), with or without BioCCS, is the second lowest priority in the cascade principle. Emission reductions should be the priority, if BioCCS is not placed correctly in the cascading use of biomass, it may risk contributing to positive emissions beyond the system boundaries.

While the methodology states that emissions factor applied with consumption of biomass should be calculated following the Annex VI of [the RED III], it would be useful to have more specific guidance and key principles provided in this methodology here, to help potential users.

Regarding potential co-firing application: if a BioCCS plant co-fire fossil fuels and bio-based fuels, the mixed flue gas composition needs to be analysed and determined, with related carbon emissions calculated and taken into account of the overall emissions balance (as described in Equation 7 (p.15) for GHG combustion).

- Section 6: Sustainability Requirements

Appendix A to Annex 1 to Commission Delegated Regulation (EU) 2021/2139

The methodology makes no reference to LULUCF practices which are particularly relevant for BioCCS applications.

Points (ii) to (v) are too subjective and do not provide any guidelines for methodology of assessing the sustainability criteria. One should provide a Life cycle analysis of the biomass processing independent of the CCS activity to show its real potential of removing carbon dioxide while linked to the CCS component.

The limit of a 25% biomass consumption increase and 30% output capacity is unclear and appears arbitrary. Instead of capping biomass consumption increases to avoid unsustainable use of feedstocks, it would be safer to assess the amount of sustainable feedstocks available for the given activity, during a certification period. This amount would be the higher limit of biomass input permitted for use at the facility and shall be revised with the annual recertification. It is also unclear how this affects newly built installations in comparison to installations planning to fuel switch from fossil to biogenic feedstocks, as well as those installations already reliant on biomass and emitting biogenic CO_2. The methodology should result in a preference towards projects with existing biomass flows in comparison fuel switching or new installations which are more likely to increase overall biomass demand.

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Bellona Europa is an independent, non-profit organisation that meets environmental and climate challenges head-on. We are result-oriented and have a comprehensive and cross-sectoral approach to assess the economics, climate impacts and technical feasibility of necessary climate solutions. To do this, we work with civil society, academia, governments and polluting industries.